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Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with radio technology.

New address as of 2023-05-04 - ***www.zeroretries.org***

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - https://www.zeroretries.org/p/zero-retries-0099

Request To Send

By Steve Stroh N8GNJ

Publicly Accessible Amateur Radio Content

Credit where due - my worldview about public access to content and technology evolved considerably from my exposure to Amateur Radio Digital Communications (ARDC)'s Open Access Requirement:

> *Because ARDC works with and for the public, we require that the work of the projects we fund be freely available to everyone who can benefit and to everyone who can contribute. Thus all technology, documentation, and other materials produced using ARDC funds must be made freely available to the public.*

I recently read a Zero Retries Interesting article about the growing trend to (re)create Amateur

Radio networks using the better Packet Radio technology of this era (such as Raspberry Pi computers vs Z80-based TNCs). The author made a number of good points, and a few points that I don't agree with. I'd enjoy having a public discussion with the author.

But, because the article is hidden behind a paywall, a debate wouldn't be that interesting because those wanting to follow the debate couldn't read the original article.

I think this issue - Amateur Radio content hidden behind paywalls - is *existential* to creators and publishers of Amateur Radio content. The problem isn't limited to Amateur Radio; as much as I love **Make:**, they also have the "paywall" mentality. While Make: Issue 84 featured *three* articles about Amateur Radio, you cannot read them without buying the issue or being a subscriber to Make.

Amateur Radio has always had an ethos of openness and sharing. In previous decades, heck, even previous centuries[1], publishing in a magazine *was* making it public. That's because "in print" was the only viable method of making content available - *then*.

But in *this* era, the "you must *pay* for access to *our* content" model increasingly doesn't work. Yes, paywalls can work, but only for unique, highly specialized, and timely content that's unavailable elsewhere. The problem of that model is that there are now practically infinite methods to create content and make it available online, and most importantly, alternative methods of *funding* that independent creation.

Seeing this "gap in the market", that the "traditional Amateur Radio media" didn't make the leap into "publicly available content", many of us Amateur Radio operators with an idea, or just a perspective, decided to give it a try and see if there was an audience for *our* content. As I now mention in every issue of Zero Retries (see Closing the Channel at the end of each recent issue), there's an increasing amount of publicly available content that's Zero Retries Interesting.

Bringing it back to the "good article about the growing trend to (re)create Amateur Radio networks…" that started this article, there's no point in discussing that article here in Zero Retries because readers expect to be able to click on a link to something I reference so they can read / view it for themselves.

But I *can* link to a pretty good YouTube video about a very similar subject - Building a Linux Packet Node. (I typed in "packet radio" in the YouTube search and wow… there are a *lot* of videos about Packet Radio.)

That one example, to me, neatly illustrates that in *this* era, the "enemy" of content creators and content publishers isn't freeloading… it's *irrelevance*. As in, *in this era*, when content is hidden behind a paywall, it's effectively *invisible*, and thus irrelevant.

The most profound example of this in Amateur Radio is that 73 Magazine, whose last issue was *2003-09*, is *more relevant to Amateur Radio in this era* than any of the currently published ARRL magazines or CQ - because 73 Magazine is *publicly available*, and the others are *not*. Example - check out this article about PC Clones for Amateur Radio (circa 1988).

Zero Retries is only possible *because* I'm able to reference other content that's publicly accessible. Thus, I've evolved my perspective regarding Amateur Radio content:

In this era, Amateur Radio content hidden behind a paywall is effectively invisible, and thus irrelevant.

/ Steve N8GNJ

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Thought Experiment - Neil's Night - Part 3

By Steve Stroh N8GNJ

One of my most profound joys is to have conversations with people much brighter, more experienced, and more talented than I am. Such conversations often lodge in my mind, and are brought forward by other conversations or experiences in a synthesis of combined thoughts. This idea / story is an example of that.

This is a thought experiment (a specialty of Zero Retries, where I air out, rather than self-censor some of my "irrationally exuberant" ideas) about creating an annual event on July 20th to:

- *Commemorate, via Amateur Radio, the anniversary of humanity's first steps on the Moon in 1969;*
- *Encourage Amateur Radio Earth Moon Earth (EME; "Moonbounce") communications especially to those that haven't tried it;*
- *Expose the fun of Amateur Radio to the public and especially techies (hopefully, young techies) by staying up late on a summer evening pointing antennas (and computers) at the Moon.*

Continued from Zero Retries 0098 - Neil's Night - Part 2.

Details of a Neil's Night Receive-only station

The primary aspect of a Neil's Night Receive-only station is that it should be approachable and understandable by techies from the public, and also Amateur Radio Operators who don't have previous experience. All the components should be visible and easily explainable.

Antenna
The antenna is the most visible aspect of an EME station. Commercial (all-aluminum) antennas look intimidating to those with no experience with radio technology. Homemade antennas such as Yagi antennas are easy and inexpensive to build out of plastic pipe or wood (1), (2), (3) and just about any type of wire for the elements. Thus homemade antennas may seem more approachable and understandable. They're so inexpensive and easy to build, perhaps build two, one for horizontal polarization and one for vertical polarization and use them simultaneously on different receivers.

Antenna Positioning
For EME, given that the Moon changes position relatively slowly and it's so visible in the night sky, manual aiming of antennas is probably adequate.

Antenna positioning using the "armstrong" method certainly works, but holding an antenna gets tiring after a while, however lightweight the antenna.

The antennas discussed above are lightweight, thus an inexpensive video / still camera tripod can be used to support and aim the antenna. There are also many sturdier options for a tripod mount (type "tripod" in the search box); speaker stands are sturdy and reasonably priced on Amazon (type "speaker stand tripod" in the search box).

Keith Pugh W5IU (Silent Keyboard) designed a nice manual azimuth / elevation antenna stand that seems easy to build from inexpensive parts.

If you're up for a challenge, Robert Goodman K3RRR has offered several ideas on inexpensive automatic antenna tracking systems - (1), (2).

Receiver
There are numerous Software Designed Receivers available that would likely work for Neil's Night activities, such as:

- RTL-SDR RTL2832U DVB-T (~$33). In my opinion, these are the best of the "SDR dongles".
- SDRplay RSP1A (~$109); there is also a Metal Case option (recommended).
- AirSpy R2 (~$169)

All of these units receive their power via USB; no external power is required.

To minimize signal loss inherent in a long coaxial cable, I suggest mounting the receiver *on* the antenna (short feedline), and use a long USB cable to connect the receiver to the receiver laptop.

Laptop Computer for Receiver
The units above require a computer. Given the venue (outdoors, temporary), a laptop seems the most practical computer. Some of the software that supports the radios above is cross-platform, and some is Windows-only. In Amateur Radio, Windows is the most universal operating system so it's probably most practical to use a Windows laptop.

Laptop Computer for WSJT-X JT65 Software
It may be possible to run the Software Defined Receiver software and WSJT-X on the same computer, but there are two separate operations being performed - radio management (tuning, looking for good signals) and the "modem" software (JT65). Thus it seems optimum to have two displays and in the Neil's Night scenario (outdoors, temporary) it probably makes sense to use two laptops. As discussed above, it's probably most practical to use a Windows laptop.

Linking the Computers
If there are only two computers, the simplest way to network them is to use an Ethernet cable

between them. Depending on the age of the computer, an Ethernet crossover cable might be necessary. Also, assigning static IP addresses and appropriate routing will be necessary.

I suggest linking the two computers to use a Virtual Audio Cable. Disclaimer - I know nothing about this at the moment - setting it up will be one of the many learning experiences in this project. It may be simpler… saner… to try connecting the analog audio out of the radio laptop's external speaker jack to the audio input jack of the modem laptop.

Once the computers are communicating, the radio software and the WSJT-X software need to be configured to export the audio from the radio software to the WSJT-X software.

Powering the Computers
Laptop computers tend to use battery power fast when doing compute-intensive tasks like Software Defined Radio and the WSJT-X. Neil's Night activities will hopefully last several hours, thus it's prudent to use a portable power station such as the Bluetti EB3A (I have one and recommend it)2 to power the computers.

Basics - Popup Canopy, Table, Chairs, Etc.
Hopefully the weather will be good every Neil's Night… but best not to count on that. If possible, bring and set up a canopy to shelter the computer table.

Bring a portable table with plenty of room - a 6 foot table is probably optimum.

Chairs should be provided for the antenna operator, and the two computer operators. But bring a lot of chairs for the various attendees, and most importantly for those really interested to sit next to the computer operators so they can see what's happening.

Optional - Large Screen Television(s)
If there is room, and suitable units can be loaned for Neil's Night, it may be impressive to display the radio and the WSJT-X displays on large screen televisions (or just external monitors away from the laptops). The laptops are display settings are adjusted to "mirror" their integral display to an external display.

What Neil's Night Isn't

Earlier in the article, I mentioned various activities that also showcase Amateur Radio to the public:

- Amateur Radio on the International Space Station (ARISS)
- Parks on the Air (POTA) / Summits on the Air (SOTA)
- ARRL Field Day / Winter Field Day
- Amateur Radio exhibits at science museums such as Hall of Science Amateur Radio Club at the New York Halll of Science in Flushing, New York
- Temporary exhibits at local events such as county fairs, etc.

Neil's Night's will showcase Amateur Radio to the public in ways beyond these existing activities.

- The nature of ARISS activities is that they have to be planned, in detail, months or even years in advance. Neil's Night is ad-hoc; publicize a bit in advance of each July 20th about where a Neil's Night station will be, and show up as promised, and hopefully the public will also show up. Neil's Night is casual and easygoing in comparison to ARISS activities.

- POTA and SOTA are contact-oriented, although especially with POTA there can be an element of showcasing Amateur Radio to the public. Neil's Night adds a big "hook" to the idea of communicating via Amateur Radio - *bouncing radio signals off the Moon - at night!* At least in my mind, that's a bit cooler than HF radio communication.

- ARRL and Winter Field Day attempt to have some element of showcasing Amateur Radio to the public, but typically Field Day stations are well-organized towards the goal of making contacts, thus not very approachable by the public. In contrast, Neil's Night's primary goal is showcasing Amateur Radio to the public.

- Permanent and temporary exhibits about Amateur Radio attempt to showcase *alll of* Amateur, and that's tough to do well. Neil's Night showcases Amateur Radio in one way - invoking the anniversary Apollo Lunar Landings by attempting EME communications.

Neil's Night - *Not* a Contest

It may seem reasonable (to Amateur Radio Operators) to structure Neil's Night communications as a radiosport contest. For example, ARRL Field Day which is presented to the public as a "test of emergency communications capability" is structured as a contest - the goal of a Field Day team is to make as many (verifiable) contacts as possible.

For those who prefer the motivation of a contest, the ARRL EME Contest is held on weekends each August, September, October, and November.

As I envision it, I don't think Neil's Night fits the paradigm of a contest:

- Many Neil's Night stations / demonstrations will be the first time they've attempted EME operation.

- Many Neil's Night stations will be receive-only.

- Neil's Night stations will be showcasing EME to the public and contest operations are intensive, focused work.

- The overriding goal of Neil's Night is to have fun; the (self-imposed) pressure of a contest environment might impede the fun aspects.

Is Neil's Night a Good Idea? *Help Needed!*

Organize Big Dish Stations

One of the biggest issues to create Neil's Night is to organize the big stations to get on the air on July 20th and coordinate their activities so they don't interfere with each other. As a humble newsletter editor with no background in large scale on-air events… or contests… or EME, *I have no idea how to do this*. Thus help (lots of it) is required to make Neil's Night a reality.

What *Band* to use for Neil's Night EME?
Another issue to be resolved is what's the best Amateur Radio band for Neil's Night activities?

- 6 meters (6m - 50 - 54 MHz) seems a popular choice for EME operation. A significant factor in favor of using 6m for EME is that most (all?) current HF radios include 6m at full power of the transmitter - typically 100 watts. However, the spacing and element size of a 6m yagi antenna make for a large antenna. But, perhaps 6m just works better for EME - especially receive-only?

- Antennas get progressively smaller (and thus easier to build a high gain antenna with more elements) as you go higher in frequency - 2 meters (2m - 144 - 148 MHz), 70 centimeters (70cm - 430-450 MHz), and 23 centimeters (23cm - 1240 - 1300 MHz). "Full Power" (100 watts) transmitters for 2m and 70cm are reasonably available via the popular Icom IC-9700 radio, but the IC-9700's 23cm transmitter is only 10 watts.

- For simplicity of planning and maximizing the chances of "working EME" on Neil's Night, it seems most practical to choose just *one* band for Neil's Night EME communications.

Certificates of Participation
One of the cooler things that I could imagine as part of Neil's Night would be to offer a unique, electronic certificate (full page electronically generated PDF) for participating in Neil's Night activities. For example, if a "youth science club" is successful at receiving an EME transmission from W1MX, the science club sponsor can go online and "authenticate" that they received a particular transmission (entering in a sequence number transmitted at a specific time and frequency) and if verified, be able to print out a "I worked *the Moon* on Neil's Night" certificate with each participant's name. If I was a ten year old techie staying out late in a parking lot with a bunch of other techie kids as part of a group using radio equipment pointed at the Moon, such a certificate would be have a proud place on *my* bedroom wall.

Promotion to the Public
For Neil's Night 2023, the window for inclusion in Amateur Radio magazines has already passed. Perhaps Amateur Radio YouTube channels could help promote Neil's Night because their lead times for inclusion are short.

I hope that Neil's Night would be a fun idea that would serve to expose Amateur Radio as a fun technical activity and thus perhaps organizations like Hackaday, Make Magazine, RTL-SDR blog, SatNOGS, individual makerspaces and science museums, etc. that are adjacent to Amateur Radio might want to participate in Neil's Night and promote it.

Document (Record on Video) Neil's Night Activities
Remember that a primary goal of Neil's Night is for Amateur Radio to be perceived as relevant (and interesting, and fun) by the public. Recording Neil's Night activities on video will help amplify the effect of Neil's Night activities. There are several *types* of video recording:

- Record snippets on a phone and upload them to Facebook or YouTube.
- Perhaps one of the Amateur Radio YouTube channels will want to assemble the clips into a well-produced video such as The Last BIG Field Day by Gary Pearce K4AAQ, or HAM by Kal Bailey.

Help Make It Simpler
While I've included links to similar, applicable projects such as antennas and azimuth / elevation stands, all of those are general guidelines. For example, one set of plans for a yagi antenna shows the calculated dimensions between elements, but is not a set of plans. It would be idea if (assuming 70cm is chosen for Neil's Night), someone published both a detailed plan for a 70cm yagi, but also a video of how to fabricate the components and assemble the antenna.

WSJT-X seems to be a flexible, and thus complex piece of software, so it may be intimidating for novice users to configure WSJT-X and JT65 for Neil's Night EME operation.

There's also the issue that JT65 is connection-oriented; there doesn't seem to be an option for *receive-only* JT65 operation. Thus figuring out if receive-only JT65 is feasible, and perhaps modifying WSJT-X to create "JT65RO" (JT65 Receive Only) would make receive-only Neil's Night stations feasible.

neilsnight.org
If the idea of Neil's Night gets some traction, I've reserved the domain neilsnight.org that I would be willing to offer to the effort.

Part 3 is the last of the details of Neil's Night. *Thought Experiment - Neil's Night - Part 4* will be the conclusion and will be an imaginary description of an "average" Neil's Night event, and will be written either as a news article describing the event or as a "bystander observation".

To be continued in Zero Retries 0101, scheduled for publication 2023-06-02.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

M17 OpenHT - A Breakthrough In Ham Radio

Wojciech Kaczmarski SP5WWP on Reddit Amateur Radio Developers:

> This is Woj from the M17 Project. We are about to finish the design of our new handheld transceiver, a TR-9 successor, the OpenHT. I'm sure some of you still remember our first attempt that didn't really take off (due to some f-ups in the RF

> PA design etc. - *mea culpa*). Well, we didn't give up and are still in business. As the protocol is mature and sees a lot of implementations worldwide, we decided to focus on the handheld radio. In the meantime, we are also working on a new revision of the Module17 modem board, so stay tuned. We hope to have both designs ready before HAM Radio Friedrichshafen (Germany, June 23-25), where we want to showcase them.
>
> The OpenHT, at least in its Proof of Concept stage, is a complete QRP SDR handheld transceiver. It's built around the STM32F469I-DISCO board. Morgan ON4MOD designed an awesome RF shield for it. Some technical details behind the design:
>
> - duobander: 389.5 - 480, 2400 - 2483.5MHz (RX, TX frequency ranges are limited by your local laws)
> - low RF power output: <14dBm (<25mW)- complete I/Q transceiver allowing for virtually any mode (including M17 and FreeDV)
> - the radio uses the AT86RF215 low-cost I/Q transceiver chip by Microchip/Atmel
> - use of an FPGA (Lattice LIFCL-40) as the AT86<->STM32 interface allows to offload the MCU (FPGA does the DSP heavylifting, all the way from RF stream to baseband)
> - the radio will run a port of OpenRTX on it
> - hardware is TAPR licensed
>
> Supported modes so far
>
> - Analog: FM, AM, SSB, OOK (CW)
> - Digital: M17, FreeDV, crude "4FSK", SSTV, 16QAM, BPSK/QPSK/DQPSK, OFDM, AFSK, APRS

The choice of “dual band” - the Amateur Radio 430 - 450 MHz band (70 cm) and the “generally license exempt” 2.4 GHz band is interesting. It was briefly tempting for me to imagine that Amateur Radio Emergency Data Network (AREDN) mesh networking protocol could be ported to this unit, but AREDN is designed for Wi-Fi chipsets, and this unit is a SD transceiver, so probably not.

In saying:

> low RF power output: <14dBm (<25mW)- complete I/Q transceiver allowing for virtually any mode (including M17 and FreeDV)

I’m puzzled how *low power output* “allows” *virtually any mode*. As I understand it, not including a power amplifier in a software defined transceiver enables a *wider range of frequencies (direct from the RF chipset)*, not different modes.

Despite the timing of this announcement (the weekend prior to Hamvention 2023), there's no hint that an OpenHT prototype will be demonstrated (or even discussed) at Hamvention 2023.

Suggestion to M17 Project - announcements of this magnitude would be more easily noticed and promoted if they were also posted on the M17 Project website in a (new) News section. Also, while M17 Project's website mentions its first ARDC Grant - M17 Open Protocol (actually awarded in 2021, but it's noted as 2020) but not its second ARDC grant in 2022 - M17 Project Popularization, Research and Development.

My thanks to Grant Hopper KB7WSD for bringing this interesting development to my attention.

Leave a comment

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Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- **Pseudostaffers** that write about about "Zero Retries Interesting" items on their blogs that I don't spot:
    - Dan Romanchik KB6NU
    - Jeff Davis KE9V
- **Newsletters** that regularly feature Zero Retries Interesting content:
    - Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.

    - Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC.
    - TAPR Packet Status Register has been published continuously since 1982.
    - Other Substack Amateur Radio newsletters recommended by Zero Retries.
- **YouTube channels** that regularly feature Zero Retries Interesting content:
    - HB9BLA Wireless by Andreas Spiess HB9BLA
    - KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
    - Modern Ham by Billy Penley KN4MKB
    - Tech Minds by Matthew Miller M0DQW
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

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Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA.

2023-05-19

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

1

Some of the magazines I've donated to the Digital Library of Amateur Radio & Communications (DLARC) are from the *1920s*. Fascinating reading!

2

Personal endorsement, not sponsored.